

**Residue/Reject Study**  
Waukesha County Materials Recycling Facility, *Waukesha, Wisconsin*  
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## **Background**

The Waukesha County Materials Recycling Facility (MRF) is owned by Waukesha County and operated by a private company under contract. The MRF has been in operation with the existing equipment configuration since 1995, when the facility was enlarged and updated. Annual tonnage processed is about 24,000 tons during one shift, 5 days per week.

Under the contract with the operator, the amount of “process residue” is limited to a maximum of 5% by weight. “Process residue” is defined as recyclable material that is disposed of as waste. “Rejected material” is defined as the inadvertent delivery of non-recyclable waste; that is residents put materials in their recycling bins that are not recyclable under the county program. Waukesha County wanted to establish baseline data regarding the type and amount of materials in the residue and reject streams in order to target education of the public and to assist the operator in minimizing the amount of waste disposed.

## **Methodology**

RMT, Inc., the consultant hired to conduct the study, characterized the reject/residue waste stream on six separate days between June 8 and June 18, 2004. Materials from waste hoppers were sorted into 16 separate categories, weighed to the nearest half pound and recorded. On a given day, approximately 6 to 10 waste hoppers were sorted. See Table 1 for details on the sorting categories.

The Waukesha County MRF receives two process streams, paper and commingled containers. Paper consists of newspapers, phone books, magazines, corrugated cardboard, and household mail/paper. Commingled containers consist of steel, tin, aluminum, plastics (#1 and #2), and glass.

Three personnel conducted the physical sorting of each 2 to 3 cubic yard waste hopper. Each waste category had a dedicated, labeled container into which the waste materials were sorted. Daily sorts consisted of two hoppers from the paper line with the remaining hoppers from the commingled line. Note: in addition to the waste material from the paper and commingled sorting lines, there is also waste that is removed on the tip floor, including bulky items such as appliances and power tools. These pre-sorted wastes ranged from 100 pounds to approximately 300 pounds going into the waste compactor or the scrap metal container on a daily basis. This data is not included in this study because a comparison to the percent total could not be made.

## Study Results

	Amount Sorted	% Residue	% Reject
Total	4,299 pounds	18.8 %	81.2%
Paper line	1,671 pounds	6.5%	93.5%
Commingled containers	2,628 pounds	26.7%	73.3%

### *Paper Sorting Line*

The residue material from the paper line primarily consisted of shredded paper or torn recyclable paper (4.5% of the total paper line waste). Small amounts of recyclable glass, steel and tin, aluminum, and recyclable plastics were also found in the waste from the paper sorting line (2.0% of the total paper line waste). The reject material was found to be mainly Non-recyclable Paper at 52.6% of the total paper line waste, including over 400 pounds of a promotion publication with a plasticized cover. The remainder of the non-recyclable paper was primarily boxes and containers (*i.e.*, cereal and juice boxes, beverage cartons). Wrapping paper, bubble wrapped envelopes, and water soaked newspaper or other papers also went into this category.

### *Commingled Container Sorting Line*

The residue material from the container line primarily consisted of recyclable glass (broken bottles) at 16.5% of the total commingled line waste. Recyclable paper at 4.2% of the total was the next most significant residue. Under rejects, Non-recyclable Paper was the most significant at 21.3%. Miscellaneous plastic, including laundry baskets, toys, plastic hangers, and plastic containers without a code, was 17.9%. Other miscellaneous (Category #15), including items such as household bags of garbage, Christmas tree lights, electrical cords, diapers, and power sanding equipment was 12.9% of the rejects.

### *Statistical Analysis*

The underlying assumption is that the process stream sampling in the 2-week period is representative of the process stream for the entire year. This assumption may or may not be true as the study took place one week after the Memorial Day holiday week. Based on the June operating report, approximately 14% of the total waste stream was sorted during the six-day study.

The values presented in this study are representative only for the 6 days that this study occurred. To make projections as to what the waste streams might include throughout the year, a projection utilizing confidence intervals is needed. For example, the field study indicated that on average, 16.5% of the commingled waste leaving the facility is Recyclable Glass. This value is representative for the 6 days of the study only. A confidence interval is applied to this 16.5% value to provide a range. For example, "We are 90% confident that our commingled waste stream will contain between 9.9% and 23% recyclable glass."

**Table 1**  
**Waste Sorting Category and Criteria**

Category	Category Includes the Following	Classification
1. Recyclable Paper	Newspaper, phone books, magazines, catalogs, writing paper, household mail, corrugated cardboard boxes	Residue
2. Recyclable Glass	Clean glass bottles and jars – clear or colored (labels do not need to be removed)	Residue
3. Recyclable Steel & Tin	Clean food cans, empty aerosol cans (labels do not need to be removed)	Residue
4. Recyclable Aluminum	Aluminum cans and clean kitchen foil products	Residue
5. Recyclable #1 Plastic	Soda and water bottles, cooking oils, dish detergent and shampoo bottles, jelly jars	Residue
6. Recyclable #2 Plastic	Milk, water, juice jugs, laundry detergent & fabric softener bottles	Residue
7. Non-Recyclable Paper	Beverage cartons, cereal or pizza boxes, Chinese cardboard	Reject
8. Non-Recyclable Glass	Ceramic dishes, window glass, light bulbs, drinking glasses	Reject
9. Non-Recyclable Steel & Tin	Scrap metal, clothes hangers, pots & pans	Reject
10. Non-Recyclable Aluminum	Rain gutters	Reject
11. Non-Recyclable Plastics #3-#7*	Plastics coded with a #3, 4, 5, 6, or 7	Reject
12. Non-Recyclable #2 Plastic	Plastic containers coded with a #2: deli containers, yogurt containers or margarine tubs, flower pots or trays	Reject
13. Plastic Bags	Grocery bags, trash bags	Reject
14. Contaminated Goods	Normally recyclable materials that have been not been cleaned and contain food particles or other residue	Reject
15. Miscellaneous	Diapers, concrete, Christmas tree lights, etc.	Reject
16. Miscellaneous Plastic	Un-numbered plastics: toys, bins, utensils, etc.	Reject

\* Category underwent further sorting analysis to determine distribution of individual plastic types.